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(54) **System and device for the treatment, in particular for the washing, of fabric articles**

(57) System for the treatment, in particular the washing of fabric articles, in particular clothes, by means of an household appliance (1), in particular a washing machine (1), which can be associated to a container (11) for receiving the articles to be treated, wherein the articles to be treated can be provided with a first electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance is provided with a second electronic device (5) for communicating with said first electronic device (7) for detecting the information contained therein, wherein a receiving and transmitting element of said second device (5) is located in the upper part (2) of said household appliance (1) which is made of a non metallic material, and that the reading of the information contained in a plurality of said first electronic devices (7) by means of said second electronic device (5) takes place putting the set of the articles (10) to be treated, each one provided with said second electronic device (7), on the top (2) of the household appliance (1), in case inside a non-metallic container (11).

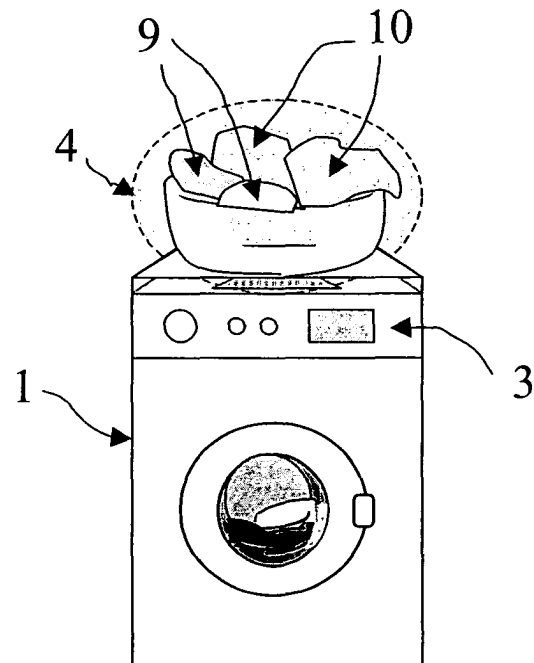


Fig. 5

Description

[0001] The present invention refers to a system for the treatment, in particular the washing, of fabric articles, in particular clothes, by means of an household appliance (1), in particular a washing machine (1), which can be associated to a container (11) for receiving the articles to be treated, wherein the articles to be treated can be provided with a first electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance is provided with a second electronic device (5) for communicating with the said first electronic device (7) for detecting the information contained therein.

THE PRIOR ART

[0002] The subject of fabric articles treatment (e.g. domestic washing or drying of clothes) has been described in several prior art documents and patents.

[0003] Such treatments, usually performed in the domestic environment by suitable household appliances, like washing machines, have to be individually adapted to the fabric articles to be treated in order to reach optimal results. A wrong treatment, set with the aid of the treatment programs, may damage the treated fabric articles or even making them no more usable. The optimal program for treating a fabric article, depends in particular from several characteristics of the article itself, like the type of fabric or the color.

[0004] As to the products to be used, e.g. washings aids, the water temperature, the lasting of the treatment, the spinning speed, all these parameters must be chosen with care. The treatment of fabric articles requires therefore a complete knowledge of the properties of the articles themselves and of their optimal care, as well as of the operation of the relative apparatuses and of the washing aids to be used. Due to the fast technical progress in this field, it is more and more difficult for a non-expert person, who faces such problems at home, to perform in the optimal way the treatment of fabric articles.

[0005] In order to facilitate such a job, it is since long time that it is known to use identifying symbols, reproduced on small tags attached to the clothes, containing information about the article and the necessary care. Such tags shall be read by the user, who shall then set the parameters of the washing machine in accordance with the relative information.

[0006] In order to help the user and avoid possible mistakes, it is known from the US patent 5,715,555 (Motorola), a both industrial and domestic washing system, comprising a tag reading device, which communicates to the washing machine the useful information for the washing, said device being contained into an electronic tag (transponder), attached to the article to be washed. The machine reads the content of the tags by means of a per se known radio electric frequency communication

system, and performs the washing according to the received information.

[0007] It is also known from the published European patent application EP 0 911 710 A2 (Bosch-Siemens), a method for the treatment of fabric articles by means of an household appliance, wherein the articles to be washed are provided with a transponder containing information about the article, and the machine is provided with a reading device, located for instance above the washing machine opening, which reads the instructions contained in the transponder at the moment when the article is put into the machine.

[0008] Said known systems show however practical disadvantages.

[0009] For instance, in the system disclosed by the Motorola patent, it is not clear how the machine can receive information if the article is inside a metallic washing drum, which is of course shielding and/or reflecting the electromagnetic waves.

[0010] In the Bosch-Siemens system the user must put the articles inside one at a time trough the opening in order to allow the machine to read the information.

[0011] Furthermore, the machine cannot know what washing aid, in particular detergent, is used by the user.

[0012] If the user puts inside articles without transponder, the machine does not notice this fact and therefore may select a wrong program.

[0013] It is also known from European patent applications EP 0 649 932A1 and EP 0 787 848 A1 of the same applicant, a method for determining type and amount of fabric articles introduced into a washing machine on the basis of the water absorption of said fabrics.

DESCRIPTION OF THE INVENTION

[0014] The main aim of the system according to the invention is that of avoiding or reducing to minimum the above cited practical disadvantages, so allowing the user not to worry about the problems related to the domestic treatment of fabric articles.

[0015] Said aim is reached by means of a system for the treatment, in particular the washing, of fabric articles, in particular clothes, by means of an household appliance, in particular a washing machine, as described in the attached claims, which also describe preferred embodiments of the system and the device according to the invention; such claims shall be considered as an integral part of the present description.

[0016] The invention will be now described in more detail with the help of the attached drawings, which refer to embodiments of the invention, and are given with indicative and non-limiting purpose only.

[0017] Figure 1 shows a front view of a domestic washing machine according to the invention.

[0018] Figure 2 shows the upper part of the washing machine according to fig. 1.

[0019] Figure 3 shows four clothes to be treated and an electronic device with an antenna, which is part of

the tags attached to some articles to be washed.

[0020] Figure 4 shows a non-metallic container with the articles to be treated.

[0021] Figure 5 shows the washing machine of fig. 1 with the container of fig. 4 placed on the top.

[0022] Figure 6 shows the washing machine of fig. 1 with an improved box of a washing aid, in particular detergent, placed on the top.

[0023] Figure 7 shows the washing machine of fig. 1 with the container of fig. 4 placed on the top, wherein the improved box of a washing aid, in particular detergent, has been added to the articles to be washed.

[0024] In figure 1 there is shown the front view of a domestic washing machine according to the invention. In figure 1 the reference number 1 indicates a washing machine according to the invention. The reference number 2 indicates the non-metallic upper part, or top, of the casing of said washing machine 1. The reference number 3 indicates the control panel and the display of said washing machine 1. The reference number 5 indicates an antenna located inside the top 2. The reference number 4 indicates the active region of said antenna 5.

[0025] In figure 2 there is shown the top 2 of the washing machine 1. The reference number 6 indicates an electronic controller connected to the antenna 5.

[0026] In figure 3 there is shown a tag 7, containing an electronic device (transponder) constituted by a microchip 8 and a receiving and transmitting antenna. The reference number 9 indicates, as an example, two articles without tag to be treated. The reference number 10 indicates, as an example, two articles with tag to be treated.

[0027] In figure 4 there is shown a non-metallic container 11, empty on the left, and with the articles to be treated 9 and 10 inside, on the right.

[0028] In figure 5 there is shown the washing machine 1 on the top of which it is placed the container 11 with the articles to be treated. As it can be seen the articles to be treated are inside the active region 4 of the electronic device which is inside the washing machine.

[0029] In the figure 6 there is shown the washing machine 1, on the top of which it is placed a container 12 (box) of washing aid, in particular detergent for washing machines, that, in an innovative manner, is also provided with a transponder.

[0030] In figure 7 there is shown the washing machine 1, on the top of which it is placed the container 11, containing the articles to be treated, to which the improved box 12 of washing aid, in particular detergent, has been added, since it is also provided with a transponder.

[0031] The way of functioning of the system composed by the washing machine 1, the articles to be washed 10 and the washing aid, in particular detergent, contained in the box 12, is as follow.

[0032] The transponder contained in the tag 7 is an electronic device, consisting of a microchip 8 with an antenna 5; the microchip contains a memory; the transponder has no supply, but it is activated by a signal re-

ceived by the antenna 5, and is then able to transmit the information stored in its memory. The antenna 5, lying inside the top of the washing machine cabinet, is connected to an electronic controller 6, and, since the top of the washing machine is non-metallic, the active field of the antenna 5 extends to a determined region indicated with 4, also outside the top 2. When, according to a preferred, but non-limiting, embodiment, the articles 9, 10 to be treated, are located, together with the detergent 12 to be used, into a container 11, made of non-metallic material (like e.g. plastic or wicker material), placed on the top 2 of the washing machine 1 (see fig. 7), the relative transponders are activated by the signal coming from the antenna 5 contained inside the top of the washing machine. The transponders of the articles to be treated and of the box of washing aid, in particular a detergent, send to the antenna 5 the relative stored information: for instance the type of fabric, the weight or type of the article (e.g. shirt or table-cloth), the maximal treatment temperature, the required washing aid, the number of treatments the article has already undergone, propensity of the article to lose its color or raveling, etc.

[0033] The controller of the washing machine is therefore able to select the optimal treatment program. If the controller detects incompatibility between different articles (e.g. wool together with white cotton), or between articles and washing aid, in particular detergent, contained in the box provided with a transponder, it provides for signaling it to the user by means of a suitable display device located on the control panel 3. It signals also the resulting weight of the articles 9, 10 to be treated. The controller may also be connected to a sensor which measures the resistivity of the washing liquid, and, among other things, it measures also the hardness of the water drawn at the moment of the washing, in order to better dosing the washing aid, in particular detergent.

[0034] The electronic controller 6 is also able to write in the microchip memory, for instance increasing of one unit the number of the treatments undergone by the articles, each time that said articles are put inside the container 11. This incremental number will give information about the wear of the article and will be considered, from time to time, in order to select the more convenient treatment program.

[0035] Also the information about the propensity of the articles to lose their color or raveling is valuable for a good operation of the machine; e.g. in the case of raveling, for the evaluation of the probability that the filter of the washing or drying machine gets obstructed after a determined number of treatments of the articles.

[0036] If among the articles there are some that do not have a transponder, at this stage the electronic controller 6 cannot take them into consideration.

[0037] It is therefore advantageous that the user put firstly in the container 11 only the articles provided with transponder, and afterward, on the basis of the communication made by the washing machine, about the weight and the type (consistent with the characteristics

of the articles provided with a transponder) of the articles which can be still added, the user adds correspondingly other articles without transponder.

[0038] Once started the washing cycle, the washing machine performs anyway the check of the absorption capacity of the articles inside the drum (see for more details the already cited documents EP 0 649 932A1 and EP 0 787 848 A1), from which the controller can determine with a good approximation the weight and the type of the fabrics which are washed.

[0039] If the controller finds a weight substantially different and/or incompatibilities that it could not determine before, as for instance the presence of silk articles, which have reduced absorption capacity, together with articles with high absorption capacity (like e.g. sponge-towels), or vice versa, it provides for signaling the fact to the user, and/or for modifying in any case the washing program for taking into account the new information. In effect the washing program adjusts itself in respect of the one initially selected, and changes the washing phases as a consequence of the actual situation found in the basin. This is possible on the basis of the performed measures concerning the washing liquid resistivity and the water quantities loaded in the initial phase of the treatment of the articles to be washed.

[0040] In this way the system according to the invention can help the user avoiding possible mistakes and taking also the presence of articles without transponder into account.

[0041] From the present description the technical features and advantages of the system according to the invention are clear.

[0042] More precisely, and in brief, the advantages are:

- 1) The reading of all transponders is made immediately and contemporarily, thanks to the fact that all the articles are put on the top of the machine.
- 2) The washing machine, recognizing the type and the amount of the articles provided with the transponder, can inform the user about possible incompatibilities between these articles and, above all, it can indicate the best way for completing the mixed loading in the best way. This means, in other words, that, in order to complete the loading with articles without transponder, (in order to optimize the washing: in fact consumption and results depend on the amount of the load), the type of compatible articles to add can be suggested. For instance, if inside the drum, there is a colored article provided with transponder, the system will suggest to complete the loading avoiding the addition of white clothes.
- 3) The machine, knowing also the hardness of the water, thanks to a suitable sensor, can suggest to the user the type and the amount of the washing aid, in particular the detergent, to be used. In the case that the user has a box of washing aid, in particular detergent, with a transponder, the machine

reads the characteristics thereof and suggests to the user how to use it for that particular laundry (it could also discourage the user from using that washing aid (detergent) in the case that it is considered not suitable for those type of fabrics). Furthermore, knowing the hardness of the water and the type of the load, the washing machine can suggest suitable washing aids to be added to the laundry.

4) The machine, thanks to its sensors, is also able to implement a customized washing cycle for that particular laundry. In effect, once started the washing, the machine is able, thanks to its sensors, to recognize the total amount of the load (and therefore the amount of articles which have been added for completing the optimal loading suggested by the machine) and the average type of fabric: such information allow to develop a washing cycle which is suitable for that laundry, and is chosen among the several washing programs stored in the memory of the microcontroller which controls them.

[0043] Since the determination of the amount of laundry and of the average type of fabric is made during the first phases of the washing (within the first 8-15 minutes), such customized washing cycle is of an adaptive type and will be defined as the process goes on. In this respect, it is clear how it is appreciable by the user the fact of having a washing machine where, if by mistake, together with white articles to be washed at 90°C, there are also delicate articles, like silk, the machine adjusts itself, and modifies the selected program, reducing the washing temperature and, if necessary, lengthening the treatment.

[0044] It is also clear that many changes may be made, and the described means or materials can be replaced by equivalent means or materials, without exiting from the claimed scope of protection. For instance, the use of the non-metallic container 11, is not mandatory. The articles provided with transponder to be treated could be simply put all together on the top of the machine 1, sending as well the necessary information to the device 5 beneath.

[0045] It is clear that, in the previously described example, reference has been made to a washing machine, but the inventive idea which is the subject matter of the present patent can be extended also to other household appliances, for instance domestic clothes drying machines.

Claims

1. System for the treatment, in particular the washing of fabric articles, in particular clothes, by means of an household appliance (1), in particular a washing machine (1), which can be associated to a container (11) for receiving the articles to be treated, wherein the articles to be treated can be provided with a first

- electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance is provided with a second electronic device (5) for communicating with said first electronic device (7) for detecting the information contained therein, **characterized in that** a receiving and transmitting element of said second device (5) is located in the upper part (2) of the casing of said household appliance (1) which is made of a non metallic material, and that the reading of the information contained in a plurality of said first electronic devices (7) by means of said second electronic device (5) takes place putting the set of the articles to be treated, each one provided with said second electronic device (7), on the upper part (2) of the household appliance (1).
2. System according to claim 1, **characterized in that** there is provided a container (11) made of non-metallic material, for receiving the set of the articles (10) provided with said first electronic device (7) to be treated, and **in that** for the use said container is put on the upper part (2) of the household appliance (1) for allowing the reading by said second electronic device (5) of the information stored in said first electronic device (7).
 3. Washing machine **characterized in that** it makes use of the characteristics according to the system of claim 1 or 2.
 4. System for the treatment, in particular the washing of fabric articles, in particular clothes, by means of an electric household appliance (1), in particular a washing machine (1), which can be associated to a container (11) for receiving the articles to be treated, wherein the articles to be treated can be provided with a first electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance is provided with a second electronic device (5) for communicating with said first electronic device for detecting the information contained therein, as well as with a third device for communicating with the user, **characterized in that** said household appliance is programmed for detecting the information contained in a plurality of first electronic devices (7) attached to a set of articles (10), each one of them being provided with said first electronic device (7), and for communicating to the user, by means of said third device, the total weight of other articles (9) to be loaded, if this is the case, for an optimal use of the appliance, and/or the type of said other articles (9) to be loaded, if this is the case, which are compatible with the characteristics of said articles (10) for which the information contained in said first electronic device (7) is available.
 5. System according to claim 4, **characterized in that** said household appliance is programmed for detecting the presence, among the set of articles (10), which may be contained in the container (11), of articles having characteristics which are each other incompatible, and for communicating it to the user, by means of said third device.
 6. System according to claim 4, **characterized in that** said household appliance is programmed for determining the type and/or the amount of the articles (9, 10) present in the drum, using a method which is based on a number of phases of water introduction, alternated to phases of water absorption by the articles, and is programmed for detecting the presence in the drum of an amount of fabrics, greater than that resulting from the information given by the first type device (7), attached to the same articles (10) and/or the presence among the articles (9, 10) present in the drum, of articles with characteristics different from those resulting from the information given by said first type device (7), and for modifying in a corresponding way the already started program, and/or communicating such facts to the user, by means of said third device.
 7. Washing machine **characterized in that** it makes use of the features according to the system of claims 4 or 5 or 6.
 8. System for the treatment, in particular the washing of fabric articles, in particular clothes, by means of an electric household appliance, in particular a washing machine (1), which can be associated to a container (11) for receiving the articles to be treated (9,10), wherein the articles to be treated can be provided with a first electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance (1) is provided with a second electronic device (5) for communicating with said first electronic device (7) for detecting the information contained therein, as well as with a third device for communicating with the user, **characterized in that** said household appliance (1) is programmed for detecting, after the start of the treatment program, selected on the basis of the indications given by the first electronic device (7) which can be attached to a plurality of introduced articles (10), the incompatibility of such a program with other articles (9) in case introduced without said first electronic device (7), and correspondingly modifying the started program and/or communicating this fact to the user by means of said third device.
 9. Washing machine **characterized in that** it makes use of the features according to the system of claim 8.

10. System for the treatment, in particular the washing of fabric articles, in particular clothes, by means of an household appliance, in particular a washing machine (1), which can be associated to a container (11) for receiving the articles (10) to be treated and a container (12) for at least an additive for the treatment, wherein the articles to be treated can be provided with a first electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance is provided with a second electronic device (5) for communicating with said first electronic device for detecting the information contained therein, as well as with a third device for communicating with the user, **characterized in that** said additive is a washing aid, in particular a detergent, contained in containers, each container (12) being provided with an electronic device, similar to said first electronic device, containing information about the washing aid, in particular detergent, and that the household appliance is programmed for detecting also such information relating to the washing aid, in particular detergent, and taking it into account for the choice of the optimal treatment program, and/or communicating to the user, by means of said third device, a possible incompatibility between the washing aid, in particular detergent, type and the fabric type of the articles to be treated.
11. Container for washing aid, in particular detergent, **characterized in that** it uses the features according to the system of claim 10.
12. Method for the treatment, in particular the washing of fabric articles, in particular clothes, by means of an household appliance, in particular a washing machine (1), which can be associated to a container (11) for receiving the articles to be treated, wherein the articles (10) to be treated can be provided with a first electronic device (7) containing information relating to the article itself and to the treatment it can be subject to, and wherein the household appliance is provided with a second electronic device (5) for communicating with said first electronic device (7) for detecting the contained information, as well as with a third device for communicating with the user, **characterized in that**, in presence of articles (9) to be treated lacking said first electronic device (7), the user provides for loading firstly all the articles (10) with said device (7), and then, on the basis of the communication from the household appliance (1) by means of said third device, of the amount of laundry which can still be loaded, adds a correspondent amount of articles (9) without said first device (7).
13. System for the treatment of fabric articles, or washing machine according to one or more of the previous claims, **characterized in that** there is provided also a sensor for measuring the resistivity of the washing liquid and/or the amount of washing liquid to be introduced into the washing machine (1).

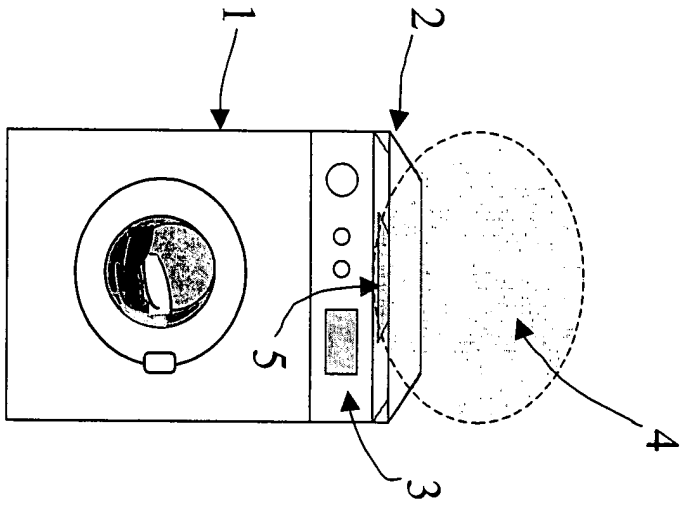


Fig. 1

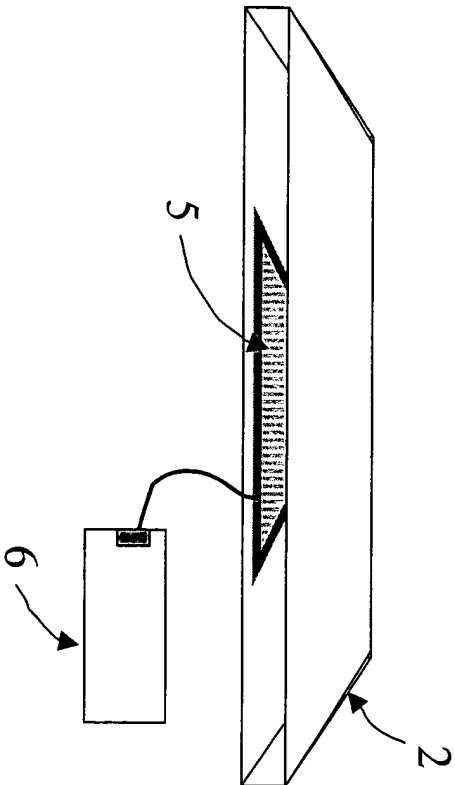


Fig. 2

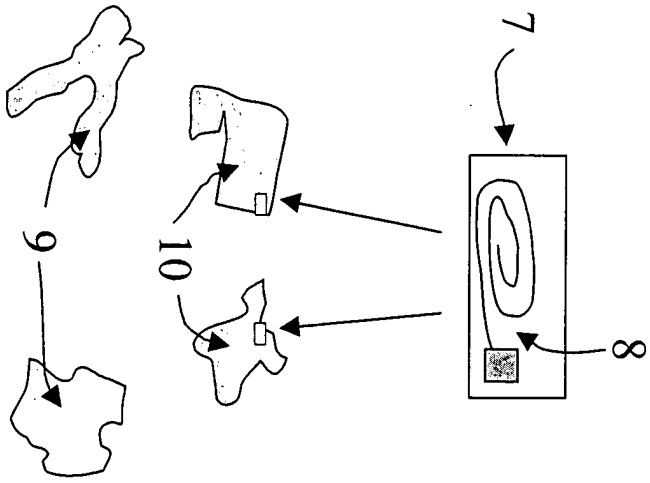


Fig. 3

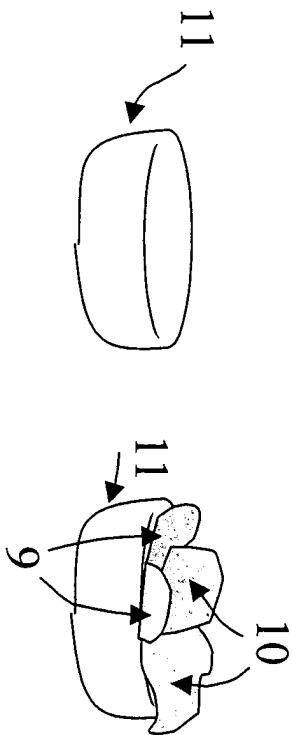


Fig. 4

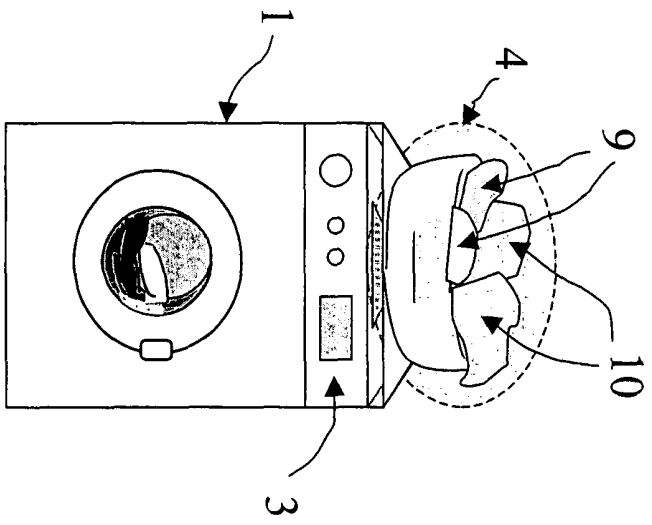


Fig. 5

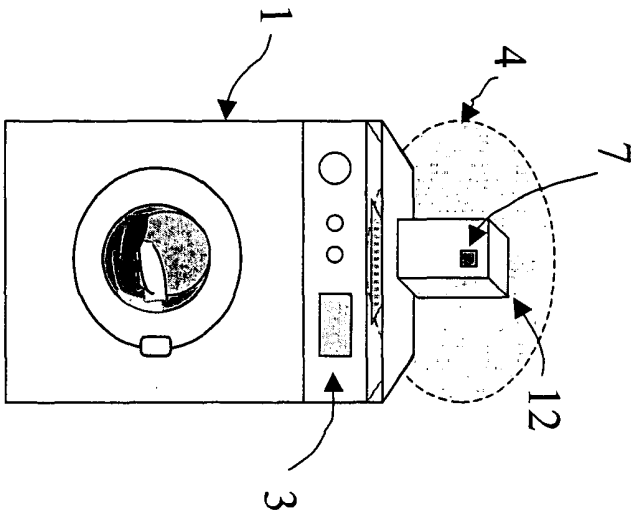


Fig. 6

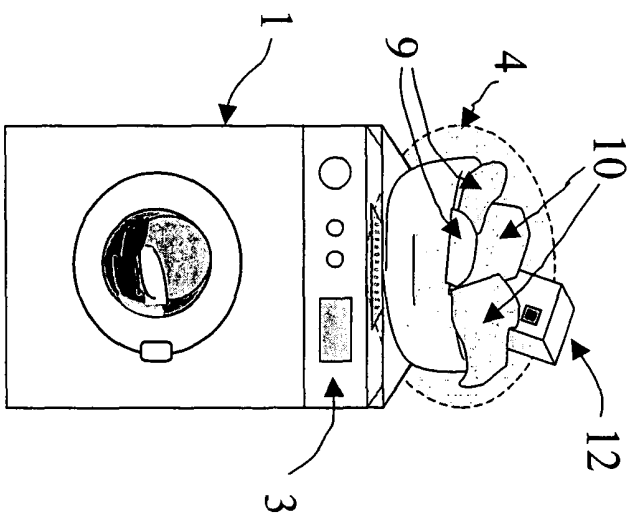


Fig. 7